DOCUMENT RESUME

ED 043 914 CG 005 943

AUTHOR	Honzik, Marjorie P.; Macfarlane, Jean W.
TITLE	Personality Development and Intellectual Functioning from 21 Months to 40 Years.
INSTITUTION	American Psychological Association, Washington, D.C.; California Univ., Los Angeles.
SPONS AGENCY	Public Health Service (DHEW), Washington, D.C.
PUB DATE	6 Sep 70
NOTE	20p.; Presented at American Psychological Association Convention, Miami Beach, Florida, September 3-8, 1970
EDRS PRICE	EDRS Price MF-$0.25 HC-$1.10
DESCRIPTORS	Individual Characteristics, *Intellectual Development, Intelligence, Intelligence Differences, *Intelligence Factors, *Intelligence Quotient, Intelligence Tests, Personality, *Personality Assessment, Personality Change, Personality Development

ABSTRACT

This is the latest in a series of reported findings for a Guidance Study which followed the same persons from infancy to age 40. The report focuses on: (1) how well the 50 men and 60 women subjects maintained their positions relative to I.Q. during the 22 years since they were last tested at age 18; (2) gains and losses in I.Q. over the 22 year period; (3) characteristics of those who have gained or lost relative to the norm; and (4) the personality development of the subjects. Case-Q sort personality evaluations were used in relation to gains in I.Q. during adulthood and I.Q. at age 40. Results of the correlations are presented. The total group results suggest that those with high I.Q.'s are cognitively very able, are self-critical, introspective, not especially interested in other people, but are coping and highly thoughtful adults. Six individual cases are presented. Some general conclusions are consistent in pointing up the complexity of interacting factors which such studies must take into account. (TL)

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PERSONALITY DEVELOPMENT AND INTELLECTUAL FUNCTIONING FROM 21 MONTHS TO 40 YEARS[1]

Marjorie P. Honzik and Jean W. Macfarlane
Institute of Human Development, University of California

Nothing is more conducive to a tempering of confidence in ability to predict than being involved in a research project which has followed the same persons from infancy to age 40 years. One is forced to discard many "bright hunches," good hypotheses, confident predictions, and discover things never intended but which post facto appear quite reasonable.

Perhaps the most germane introduction to this paper is to give an excerpt from a subject's life record which has direct relevance to the topic of "Personality and Intelligence."

One of the subjects, at age 30, was a bright, articulate, talented, prize-winning architect, and the father of two bright children. Our early records through his preschool and grade and high school years showed him to be a toneless, inarticulate, withdrawn child, held over several terms in school, and graduating from high school without adequate college recommendation. He had consistently obtained relatively low IQs through year 18. To quote him at age 30: "You have to admit I was a listless odd ball." While we were trying to ferret out with him in a long series of interviews the many factors he felt were associated with the marked changes from his first twenty years, he interrupted to say, "You personality birds could profit from an intensive art course in design. You would discover that what makes a good design, and the possibilities are almost infinite, is that combination of atypical or offbeat elements which grabs one's attention and enough compensating strengths to hold the total in balance, even precarious balance.

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People, too, come in an almost infinite variety of designs with unique individuality and compensating balancing strengths, which, in my case, were very slow in developing."

His history and those of other subjects which were not in accord with early expectancies, make us wonder at times if detailed biographies, with emphasis on intra-individual coherence and change, are not the best way to contribute to valid knowledge in the field of human development. But in addition to the case history approach, we have followed the conventional route in the search for stable group relationships between variables, and configurations of variables, across and through time, that meet appropriate significance levels. Some of these we will present in this paper.

In 1948, we reported on the stability and variability of mental test performance over the first 18 years for a cohort of children born in Berkeley in 1928 and 1929 (Honzik, Macfarlane, & Allen, 1948). The sample, selected from the birth certificate registry, was representative of this urban community at that time. (We should add that a Berkeley sample selected today in the same way would differ in many respects from that selected 40 years ago.)

These children, as members of the Guidance Study, were given fifteen individual mental tests between the ages of 21 months and 18 years. The tests used were the California Preschool Scales, Revisions of the Stanford-Binet, and the Wechsler Bellevue at 18 years. Correlations were as high as .92 for adjacent age periods but decreased markedly with the interval between tests so that we found barely positive correlations between the tests given at 21 months and 18 years. Prediction from the 3-year test was higher and statistically significant. With each passing year, the prediction of the 18-year IQ increased. The results for this group are similar to those found in a number of other longitudinal studies : Bayley (1949) for the Berkeley Growth

Study sample; Sontag (1954) for the Fels group; and Ebert and Simmons (1943) for a Cleveland sample.

Subjects in the Guidance Study are now aged 40 and have recently taken the Wechsler Adult Intelligence Scale. How well did these 50 men and 60 women maintain their relative positions over the 22 years? The correlations between the 18-year Wechsler Bellevue IQs and the 40-year WAIS IQs are .74 for the men and .75 for the women. Correlations between the 6-year Stanford-Binet IQ and the 40-year WAIS IQs are .60 for both males and females, suggesting considerable stability over a 34-year period.

The Verbal IQ is relatively more stable over the age period 18 to 40 (r = .69 for men and .78 for women) than the Performance IQ (r = .58 for men and .62 for women). The most stable subtest is Vocabulary where the r is .76 for the men and .71 for the women. The largest sex difference occurred on the short memory test, Digit Span, where the r is .75 for the women but only .51 for the men. One subject suggested that this sex difference might be related to the differential occupational demands for certain men who have had to improve their short memory span, e.g., policemen, salesmen, etc.

Our second question is concerned with the gains and losses in IQ over the 22-year period. The average IQ at age 18 was 119 on the Wechsler Bellevue; at 40, 122.8 on the WAIS. This represents a highly significant gain of 3.8 IQ points.[2] This study does not indicate the age when the peak in IQ occurs. Nancy Bayley's data for the smaller, more intensively tested Berkeley Growth Study sample, suggests that the decline in the Full Scale IQ begins in the late 30's (Bayley, 1969). Despite the substantial gains in IQ, both men and women did significantly less well on the Digit Symbol subtest at 40 than at 18 years. This is a speed test and the difference suggests a significant loss of speed and perhaps interest in this type of test. The sex differences are generally more marked than expected. Both

men and women showed marked and significant gains in Performance IQ but only the women showed a highly significant gain in Verbal IQ. This gain, and the girls' gain in Arithmetic, is in part a function of the girls' relatively low scores at 18 years. In late adolescence, the girls were cooperative but as a group were far more concerned about social skills than about intellectual achievement.

Figure 1 shows the gains in IQ in relation to the 18-year IQs. The greatest gains occurred for the group of men and women with average IQs, while the sex difference is most marked for the "bright normals" (IQs range from 110 to 119). The average gain for the "bright normal" women is substantial; the men's more moderate. The most important finding shown in this figure is the generality of the IQ gains at all ability levels, probably due in part to increased experience, e.g., information, comprehension, and vocabulary, but also may be due to an increased ability to profit by experience.

Insert Fig. 1 about here

How would we characterize the 110 adults who were tested at age 40? The occupations of the men cover a wide range from trucker to the professions of law and medicine. The exact earnings of this group have not been ascertained but they are probably above the national average. When the subjects were born, their parents were earning less than the national average but were more educated. Three men and 3 women subjects have PhD's or MD's but most of the women are homemakers who come in saying that their teen-aged children know more than they do and that their own intelligence has probably sagged with disuse. Many of the men also believe that their children are more competent than they are; but the test scores of their teen-aged children are

simply not as high on the average as those of the 40-year-old parents. Six subjects never married; 8 are divorced and have not remarried. The remaining 96 are married and have an average of almost three children per family.

What are the characteristics of those who have gained or lost relative to the norm? The scores of 16 men and 11 women were lower on the WAIS at 40 than on the Wechsler Bellevue at 18. We find in this group subjects who had accidents or illnesses involving the central nervous system resulting in specific deficits; individuals who are depressed; others who are chronically fatigued; and alcoholics, but all are functioning after a fashion in the community. Many of the small IQ changes represent, of course, errors of measurement, regression to the mean, or variations due to changes in interest, mood, or cooperation.

Fairly substantial increases in IQ occurred in the four who have PhD's and four of the six who never married. In general, the education of the gainers was superior to the remaining study members but the average difference in years of schooling between the gainers and the rest of the sample is only half a year for both men and women. However, a larger proportion of the gainers obtained degrees from high ranking universities in contrast to junior colleges; and three of the women lived in Europe for extended periods of time. Among the non-gainers were the top three popularity idols of the school years whose talents, abilities, and drives were devoted to pursuing social skills and not to the internalizing, hair-splitting thinking that helps to raise scores on mental tests.

A major focus of the Guidance Study has been the personality development of these normal men and women. Interviews with the parents began when the subjects were age 21 months and continued on a yearly basis until they were aged 17 years. Interviews with the teachers about the subjects'

behavior occurred yearly from kindergarten to the 10th grade; and the children themselves were interviewed at half-yearly intervals between 6 and 17 years. These interviews have been rated and coded as they were taken and at some later time we hope to relate these ratings to intellectual functioning. For purposes of the present report, we used Case Q-sort evaluations in relation to gains in IQ during adulthood and IQ at age 40 years.

The Q sort, consisting of 100 personality items, is designed to measure within-person or ipsative rankings of characteristics on a 9-point scale (Block, 1961). ~~Attributes considered characteristic of the individual are rated 9 and non-salient attributes are rated 1.~~ Each subject's case file from birth to age 18 was sorted for these 100 items. In an attempt to find personality characteristics in children which might predict gains in IQ during the adult years, we compared those whose IQs increased between 18 and 40 with the remainder of the sample for all 100 Q-sort items. Data for men and women were analyzed separately. Table 1 shows that few significant differences emerged. However,

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Insert Table 1 about here

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certain consistencies suggest that the findings are not all chance ones. The men (7) and women (13) who gained the most (8 or more IQ points) were judged as characteristically not gregarious as children. For both men and women, this difference is significant at the .05 level. A second significant difference was one indicating that the gaining men and women were less extreme in the Q-sort appraisals of masculinity and femininity than was true for the remainder of the group. This latter finding was been reported previously by Maccoby (1966). The only other item which was differentiating at a statistically significant level suggests that the subjects whose IQs increased in childhood were less likely to be among those who aroused liking and acceptance.

A more recent Q sort was done on these subjects when they were aged 30 years on the basis of intensive interview material. These 30-year Q sorts were performed independently of the data collected during the first 18 years. Since the 30-year Q sorts were obtained in the middle of the 22-year span between the 18 and 40 year tests, we thought it might yield clues as to the adult personality characteristics of those whose IQs increased. We again compared the gainers with the remainder of the group. Two items showed significant differences for both males and females. At 30 years, the subjects whose IQs increased little or none between 18 and 40 years tended to be more satisfied with their physical appearance and were more likely to be turned to for advice and reassurance than was true of the IQ gainers.

Table 1 shows that a larger proportion of the 30-year Q-sort items were differentiating for the men than for the women. Two items which were significantly differentiating for men at both the childhood and 30-year evaluations were introspective and tends to ruminate and have preoccupying thoughts. Other characteristics of the men at age 30 who were gaining in IQ were: is basically anxious, feels cheated and victimized by life but enjoys and reacts to aesthetic impressions. In contrast to these serious, almost gloomy characteristics of the gainers, the men who showed little or no gains in IQ on the Wechsler tests during adulthood were more likely, at a statistically significant level, to be cheerful, calm and relaxed in manner, socially at ease, productive and gets things done, and finally, likely to arouse liking and acceptance in people.

Women who gained in IQ in adulthood tended to be self defeating in childhood; while women who showed little or no gain in IQ in adulthood were more likely than the gainers to be rated physically attractive, personally charming, feels satisfied with self, and has warmth, is compassionate.

Although the differentiating items for males and females are not the same, a common trend is observable among all subjects whose IQs increase as adults. They tend to maintain distance from other people; are likely to turn inward, not out towards people; and there is some evidence for a lack of nurturance in relation to others. It is difficult to know whether the gainers' seeming lack of, or concern about, physical attractiveness is based in fact or whether it is secondary to a withdrawing and perhaps somber mien.

Thus far we have contrasted the Q-sort characteristics of those who gained substantially in IQ between 18 and 40 years with those for the remainder of the group. Table 2 presents the statistically significant correlations between the same 100 Q-sort characteristics and the 40-year WAIS IQs. This table shows that

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Insert Table 2 about here

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ten personality characteristics are correlated significantly with the 40-year IQs for both males and females. These characteristics include aspects of intellectual functioning such as: Appears to have a high degree of intellectual capacity; Is verbally fluent, can express ideas well; Is concerned with philosophical problems; Able to see to the heart of important problems; Genuinely values intellectual and cognitive matters; Prides self on being objective, rational; Has high aspiration level for self; Is comfortable with uncertainty and complexities. Two non-intellectual Q-sort items also correlated with high IQs at 40 are: Tends to feel guilty and Does not arouse nurturant feelings in others.

Highly significant sex differences emerged in this correlational analysis. Many of the girls' childhood characteristics, as judged by the case Q sort of the first 18 years, correlated with their 40-year IQs. The reverse was true for the boys where relatively few childhood but many 30-year

characteristics were predictive. This may mean that personality-cognitive interaction occurs earlier in females than males, or that the occupational experiences of the men have evoked certain characteristics and cognitive-personality inter-relationships. Among the 30-year characteristics which emerged as correlates of the men's but not the women's 40-year IQs are: Is introspective; Not responsive to humour; Is not satisfied with his physical appearance; Tends to ruminate and have persistent preoccupying thoughts; Is not cheerful; Does not handle anxiety and conflicts by repressive and dissociative tendencies.

Women with high IQs at 40 had the following characteristics during childhood (as judged by the 18-year case Q sort): Is productive, gets things done; Interprets basically simple situations in complicated ways; Over concerned with own adequacy as a person; Enjoys aesthetic impressions, is esthetically reactive.

None of these characteristics when rated at 30 years for women correlated significantly with their 40-year IQs. Characteristics rated at 30 which did correlate with their 40-year IQs are: Has a wide range of interests; Does not create or exploit dependency.

What can we make of these results? Those with high IQs are cognitively very able but tend to be self critical, introspective, and not especially interested in other people but they are coping and highly thoughtful adults.

So far we have presented group results but the greatest excitement lies in the individuals and their "assimilation and accommodation" to life's experiences. We have selected six cases who show different patterns of intellectual growth. In looking at these cases we should keep in mind that, on the one hand, the correlations between the 6 and 40-year IQs are as high as .60; but on the other hand, a third of the group showed a variation of as much as 15 points of IQ at some time between 6 and 18 years.

Fig. 2 - Case 534 illustrates a highly consistent performance from the age of 21 months to 40 years. Her scores at every age level were more than one standard deviation above the mean of the group. On her first test at 21 months, she kept asking for "more" games. At 3 years, she was judged "exceptionally bright." At later age levels, she was rated as shy, reserved, and self-conscious but her attention and effort were excellent. She skipped one grade because "her social adjustment was not good and the work was too easy for her." Another teacher considered her poorly adjusted, brilliant, but difficult to work with." As a junior in high school, her teachers considered her reticent and shy but alert and conscientious. She has an AB degree, is married and has four children whose IQs are all superior--but only one approaches her level of test performance. Both parents of this subject, who are now in their 70's, were tested and their IQs equalled her highly superior scores. Their WAIS EQs (or IQs not adjusted for the age decriment) would, of course, be lower.

Case 567's IQ at 18 is in line with the family's ability but she did not do well on tests relative to the group in her early years. The testers mentioned her negativism, lack of effort, restlessness, and, at later ages, shyness, that "she turns in rather than out," and is unsure of herself. There were straining aspects of her home situation and probably chronic tension but by the time she was in the 8th grade, her teachers considered her a calm, happy, conscientious, thoughtful girl. She has an AB degree, is married, and her children are doing well academically.

Fig. 3 - Cases 767 and 557 obtained similar scores as preschool children, followed by a marked divergence in scores. The mature IQs of both men are in line with the family pattern and the total of 12 children these men have fathered are earning IQs similar to those of their fathers, tempered by the IQs of their wives which are nearer to the group average. Case 767, with his high IQ, has an AB degree and is in professional work. He earns a good

salary but so does Case 557 who is using his good mechanical skills and friendly ways to good advantage.

Fig. 4 - Case 767 in Fig. 3 did not attain high IQs until well into elementary school but we have two cases who were even slower in obtaining IQs which were in line with the family pattern. Case 531 is the architect described at the beginning of this paper. From the point of view of cognitive development, the most startling aspect of this record is the fact that at 18 years he did well on the Performance items of the Wechsler Bellevue, which is predictive of later architectual interests, but it was not until the next test given at age 40 years that he excelled on Verbal subtests.

Case 562 was slow in achieving test scores that were in line with those of his parents, but his children are all earning superior scores as elementary and high school students. This man had a difficult time adjusting to parental demands and expectations as a child and his slow gains in IQ may be reflecting his very difficult learning experiences.

Following for 40 years individual lives in process with their great diversity of genetic constitution and associated temperament, of rates of biological growth, of varying environmental supports or strains diversely stimulating or inhibiting at different developmental stages, what general conclusions does one reach about personality and intelligence?

Briefly:

(1) That the complexity of interacting factors is such that simplistic conclusions regarding any single factor, whether it be genetic or environmental, taken out of context of the other critically impinging factors, can easily add to ambiguous knowledge and poor predictions.

(2) That no one really matures as a person or reaches his intellectual potential without an optimal amount of stress which forces more awareness--

intra-personal, inter-personal, and cognitive. Each individual, with his own unique combination of these many interacting facets, has to evolve for himself in his own style, and at his own speed, the coherent patterns that work for him.

(3) That intellectual and personal growth may go on with new dimensions added over many decades, in contrast to the accepted fact, when we began this study in 1928, that your IQ was your IQ and you had reached it by age 16!

(4) The intelligence scales did not include social intelligence and some of the very wise and perceptive subjects did not excel on the mental tests. In fact, some of the correlations reported in this paper suggest that the relation of "social intelligence" to the mental abilities measured by the Wechsler tests is extremely low.

In earlier studies of this group we have shown their increasing resemblance to the parental level of ability and that some individuals reach this level sooner than others (Honzik, 1957, 1963). We have shown that affectional relations among family members are related to later intellectual functioning, especially verbal abilities, but that the nature of the relevant affectional interactions differs for boys and girls (Honzik, 1967a & b). It is significant that gains in Verbal Ability continue during the adult years when the impetus for superior language development usually occurs so early in life. We have noted quite remarkable similarities in both the total scores and profiles of abilities among the family members suggesting the combined effect of both heredity and experience. Yakoflev (1959) reports that myelenization continues to the 8th and 9th decades of life, suggesting that some of the gains may be a part of the genetic pattern; and we are very aware of the many experiences that are relevant to the development of intellectual functioning. The statistical analyses made to date (the 40-year

data are still being collected) of the personality variables is meager but is relevant in that intellectual functioning, and maintenance of intellectual functioning, was found to be promoted and to reach its highest level in individuals who are not extreme in their masculinity or femininity, were not gregarious as children, but are, rather, introspective, intense, anxious, somewhat less social than average, and generally happier in the laboratory or study than in life's wider arena.

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Footnotes

[1]Paper presented in a symposium entitled, "Maintenance of Intellectual Functioning with Advancing Years," September 6, 1970, American Psychological Association Meetings, Miami, Florida.

Supported in part by USPHS grant HD 03617.

[2]An unpublished study by Rabourn (1957) reports that the WAIS yields a lower Full Scale IQ than the Wechsler Bellevue for a sample of 50 high school graduates with an average age of 20 years. This finding adds to the significance of the difference found in the present study.

Table 1

Q-SORT PERSONALITY CHARACTERISTICS OF PERSONS GAINING IN IQ BETWEEN 18 AND 40 YEARS AS COMPARED WITH REMAINDER OF GROUP

	Q-SORT PERSONALITY CHARACTERISTICS	AGE PERIOD PERSONALITY RATED			
		21 mos-18 years		30 years	
		Males	Females	Males	Females
	t tests significant for both males and females	t[1]	t[1]	t[1]	t[1]
28	Tends to arouse liking and acceptance in people	-1.7*	-2.1**	-2.7**	- .6
29	Is turned to for advice and reassurance	- .3	-1.6	-2.9***	-2.6**
54	Gregarious, emphasizes being with others	-2.6**	-2.1**	-1.4	.5
93	Behaves in a sex appropriate manner	-2.3**	-2.2**	-2.1**	0.0
31	Is satisfied with physical appearance	- .8	-1.2	-1.9*	-3.0***
	t tests significant for males but not females				
16	Is introspective	1.7*		2.7**	
26	Is productive; gets things done	-1.4		-2.2**	
33	Is calm, relaxed in manner	- .5		-2.0**	
66	Enjoys and reacts to esthetic impressions	.7		2.2**	
68	Is basically anxious	- .6		2.4**	
78	Feels cheated and victimized by life . . .	.8		2.1**	
79	Tends to ruminate and have preoccupying thoughts	2.9***		1.8*	
84	Is cheerful	- .9		-2.2**	
92	Has social poise and presence	- .02		-2.2**	
	t tests significant for females but not males				
35	Has warmth; is compassionate		-2.4**		- .6
55	Is self defeating		2.1**		.1
74	Feels satisfied with self		- .3		-2.6**
81	Is physically attractive; good looking . .		-1.4		-2.1**
88	Is personally charming		-2.1**		- .6

*$p < .10$ level.

**$p < .05$ level.

***$p < .01$ level.

[1]A negative t indicates that the gainers are less likely to show the characteristic than the remainder of the group.

Table 2

RELATION OF 40-YEAR IQs TO Q-SORT PERSONALITY CHARACTERISTICS RATED FOR FIRST 18 YEARS AND AT AGE 30 YEARS

	Q-SORT PERSONALITY CHARACTERISTICS	AGE PERIOD PERSONALITY RATED: 21 mos-18 years Males	21 mos-18 years Females	30 years Males	30 years Females
Correlations significant for both males & females		r	r	r	r
8	Appears to have a high degree of intellectual capacity	.73***	.67***	.62***	.56**
98	Is verbally fluent; can express ideas well	.51***	.38**	.34*	.33**
51	Genuinely values intellectual & cognitive matters	.51***	.51***	.33*	.40**
71	Has high aspiration level for self	.28*	.38**	.33*	.35**
83	Able to see to the heart of important problems	.45***	.53***	.11	.13
90	Is concerned with philosophical problems	.20	.30*	.42**	.31*
24	Prides self on being objective, rational	.34*	.38**	.10	.18
9	Is comfortable with uncertainty and complexities	.44**	.31	.27	.08
21	Does not arouse nurturant feeling in others	.28*	.51***	.25	.15
47	Tends to feel guilty	.02	.39**	.36*	.15
Correlations significant for males but not females					
16	Is introspective	.27		.41**	
31	Not satisfied with physical appearance	.06		.47**	
56	Not responsive to humor	.06		.41**	
60	Has insight into own motives and behavior	.36**		.06	
79	Tends to ruminate and have persistent, preoccupying thoughts	.15		.40**	
84	Not cheerful	.20		.51***	
86	Does not handle anxiety and conflicts by repressive or dissociative tendencies	.16		.40**	
Correlations significant for females but not males					
3	Has a wide range of interests		.42***		.38**
26	Is productive, gets things done		.41***		.07
61	Does not create & exploit dependency in people		-.01		.34**
66	Enjoys esthetic impressions; esthetically reactive		.37**		.15
87	Interprets basically simple situations in complicated ways		.32**		-.07
72	Over concerned with own adequacy as a person		.34**		.09

*p .05 level.
**p .01 level.
***p .001 level.

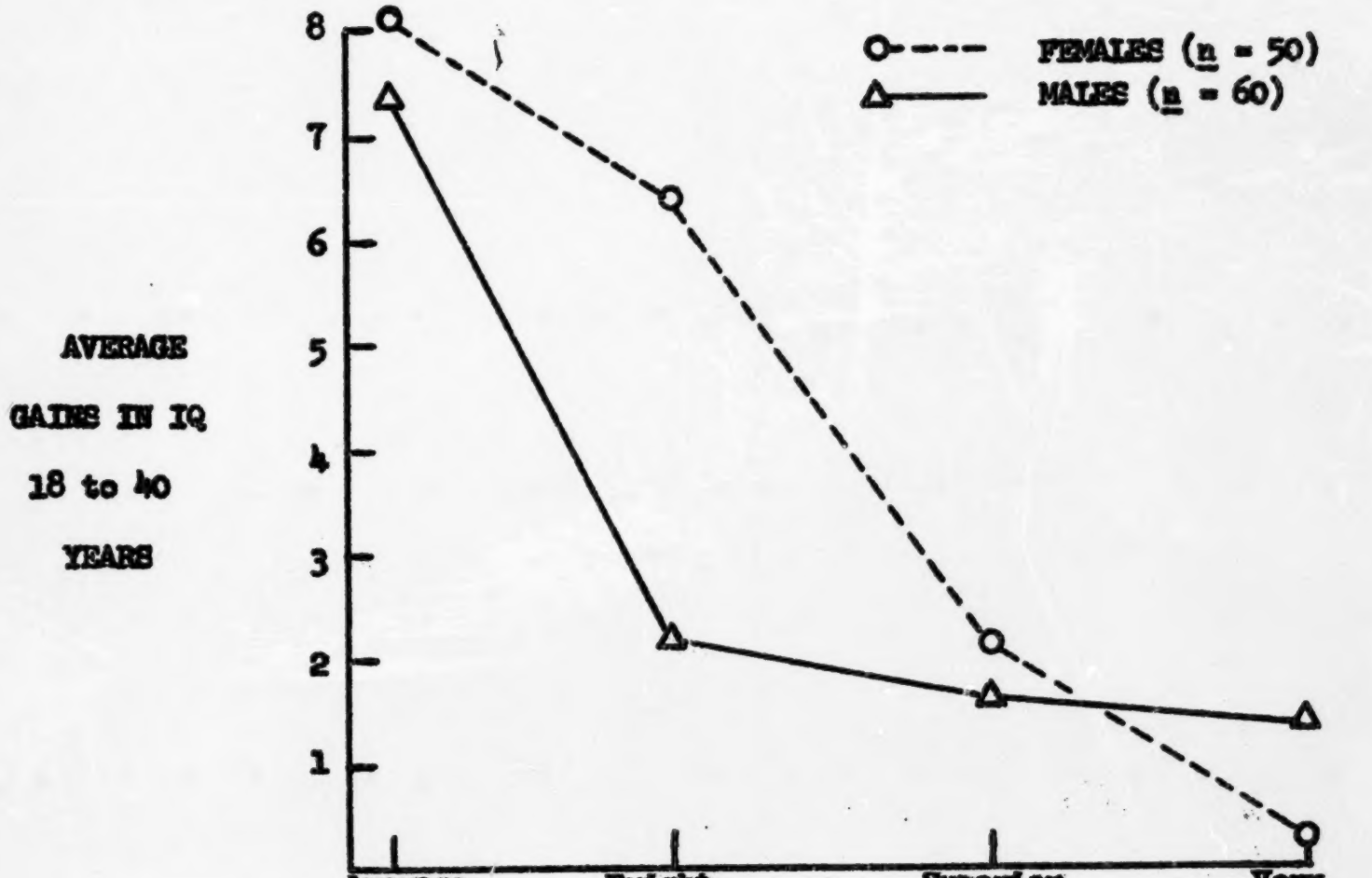
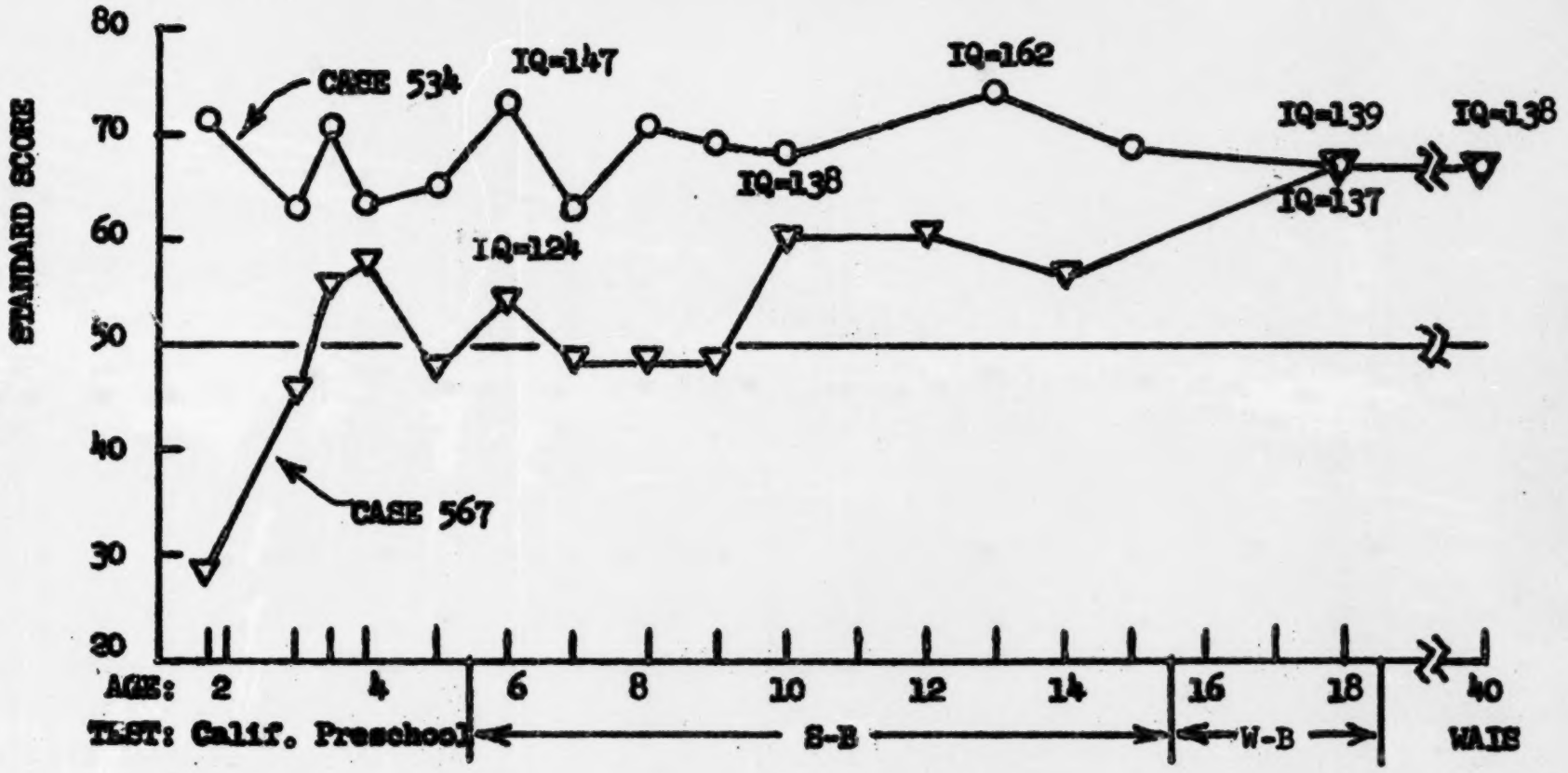

FEMALES (n = 50)
MALES (n = 60)
AVERAGE GAINS IN IQ 18 to 40 YEARS
8
7
6
5
4
3
2
1
Average
Bright-Normal
Superior
Very Superior
IQ: 90-109
110-119
120-127
128+
WECHSLER IQ AT AGE 18 YEARS

Fig. 1

TWO GIRLS WITH SIMILAR MENTAL TEST SCORES AT AGE 18



TWO BOYS WITH SIMILAR MENTAL TEST SCORES DURING THE EARLY PRESCHOOL YEARS

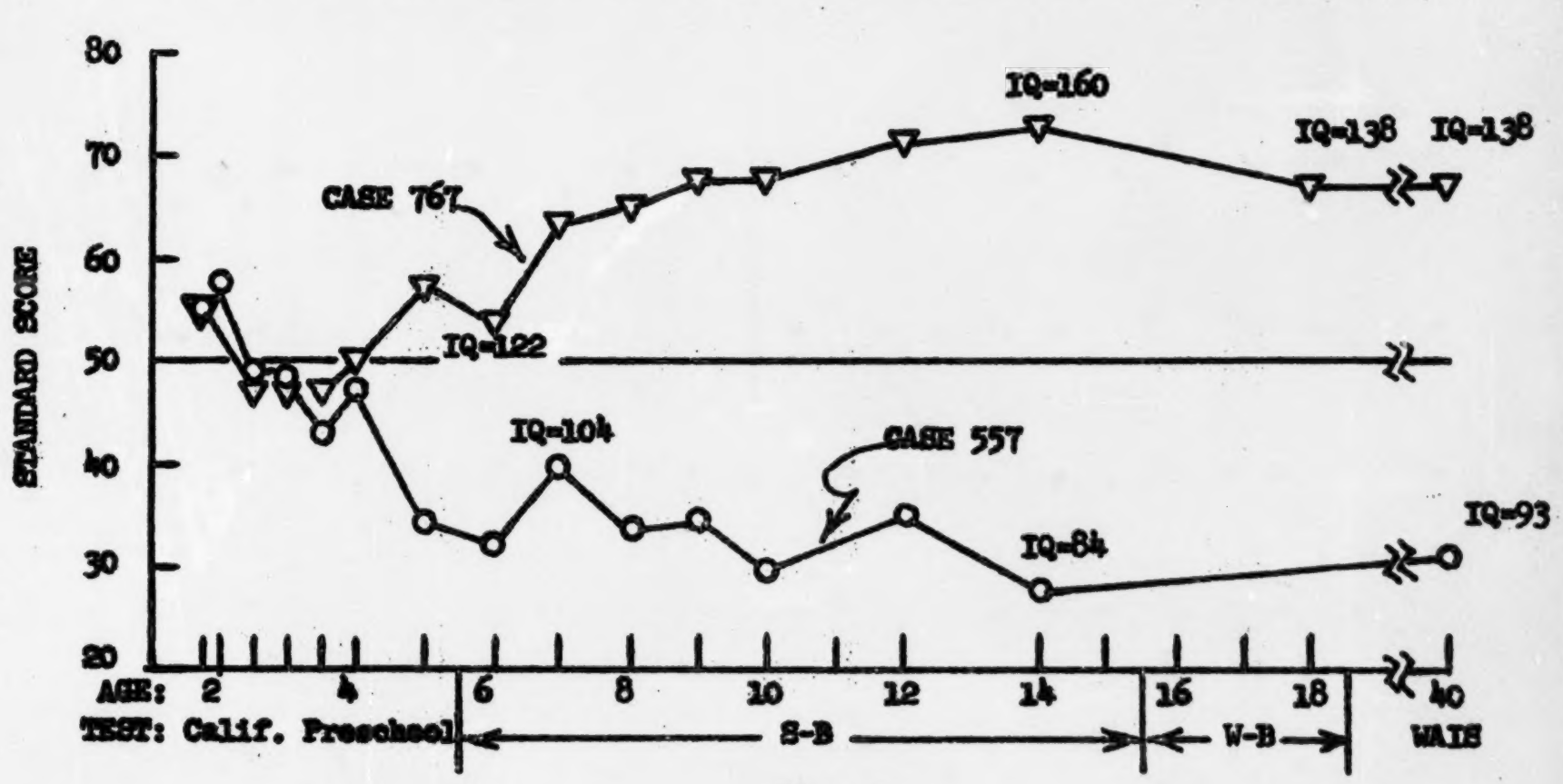


Fig. 3

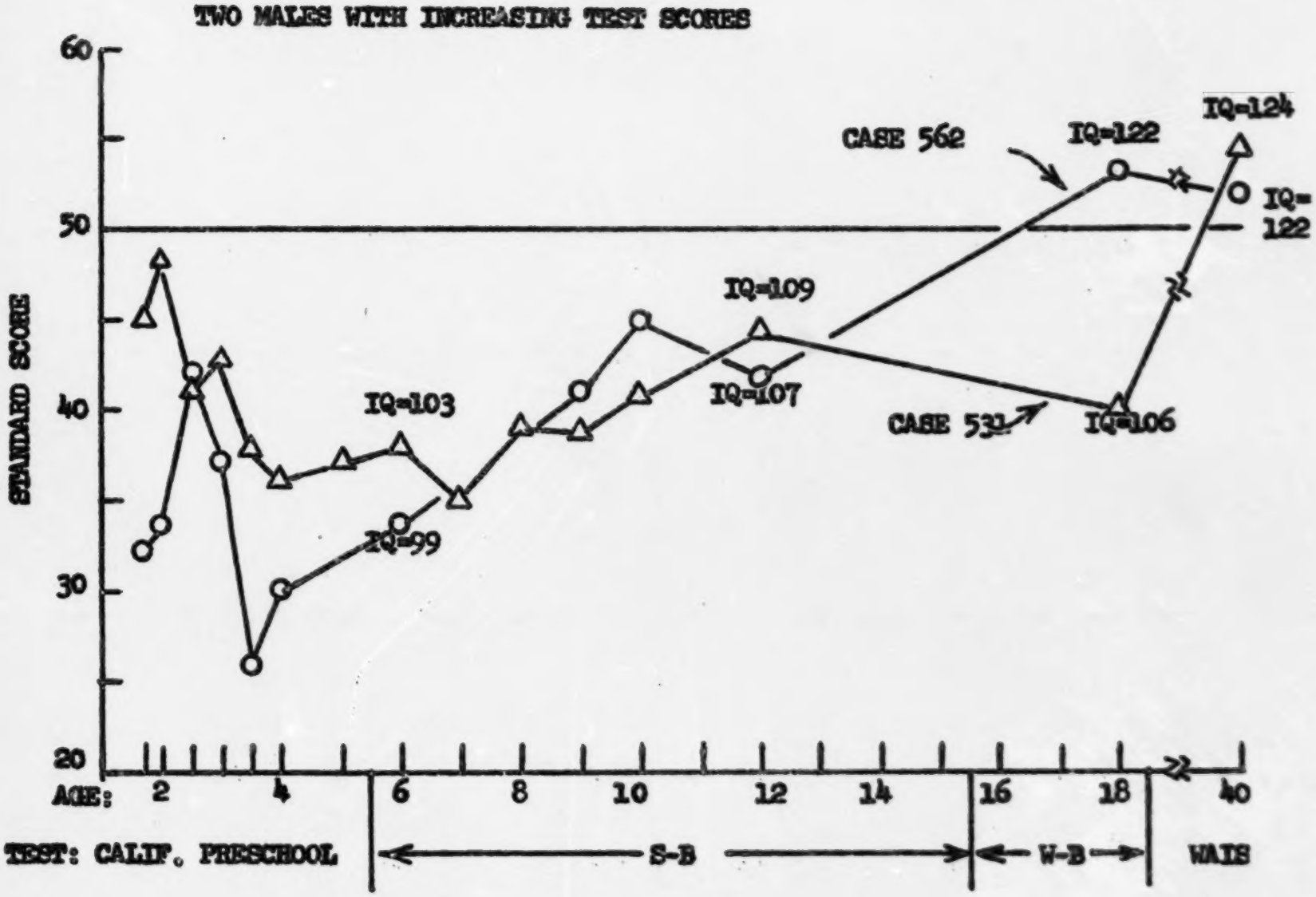

TWO MALES WITH INCREASING TEST SCORES
STANDARD SCORE
60
50
40
30
20
CASE 562
IQ=122
IQ=124
IQ=
122
IQ=109
IQ=103
IQ=107
IQ=99
CASE 531
IQ=106
AGE: 2 4 6 8 10 12 14 16 18 40
TEST: CALIF. PRESCHOOL
S-B
W-B
WAIS

Fig. 4